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Author(s): Fry, David A.
White, Sarah M.

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LANL NDT Group E-6 Overview



David Fry and Sarah White

August 31, 2020

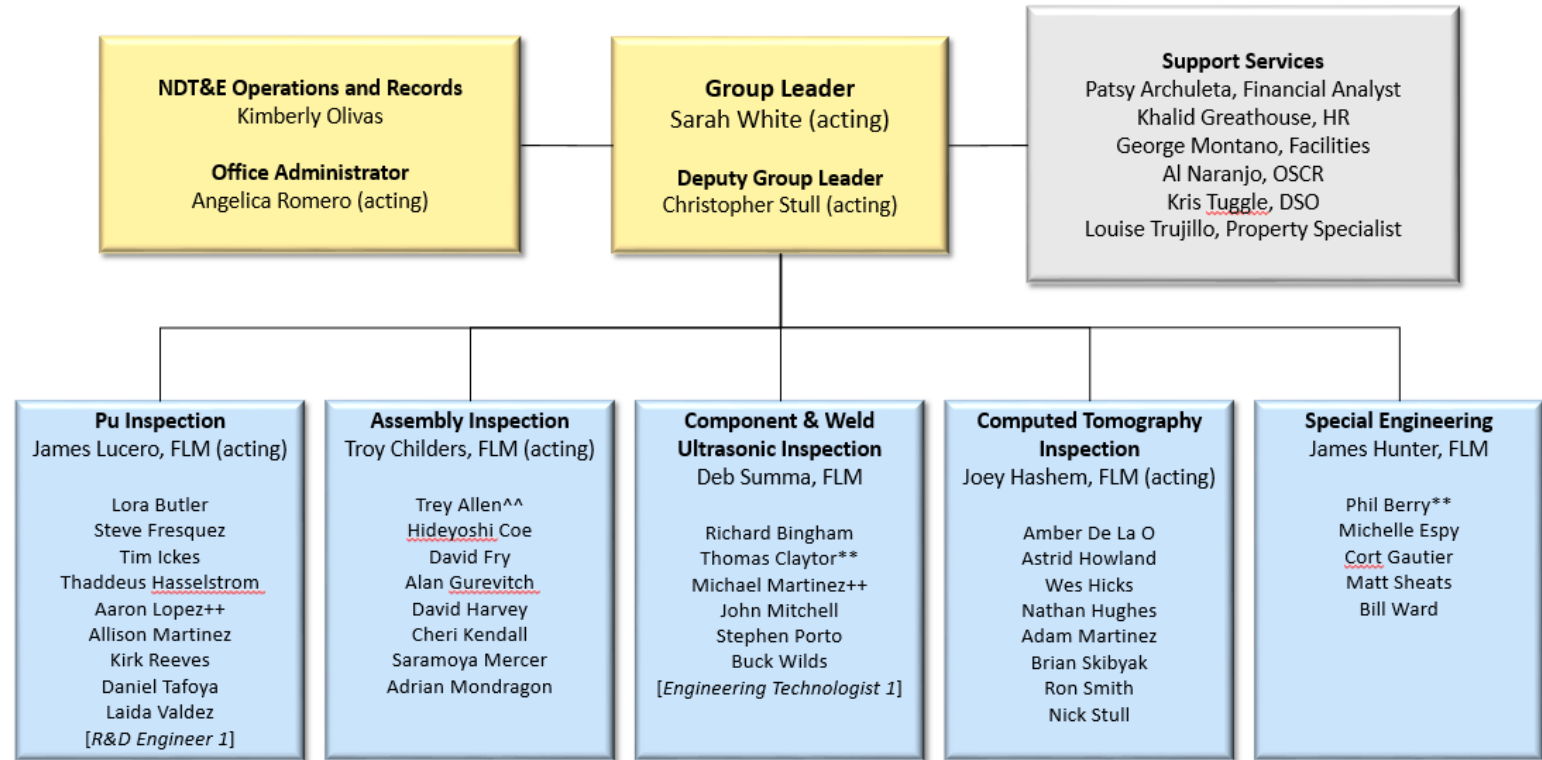


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E-6 Group Overview

LANL NDT Group Organizational Chart



^^ ExSO
++ ESO (in-training)
** Guest Scientist

E-6 Teams

- **Assembly/General Radiography**
- **UT, PT, MT**
- **Computed Tomography**
- **SNM NDT**
- **Special Engineering**

E-6 Work

- **E-6 is the Weapons NDT provider for LANL**
 - LANL Design Agency QAPD: [ADW-Q-0001U, Los Alamos National Laboratory Design Agency Weapons Quality Assurance Program](#)
 - LANL Production Agency QAPD: [PA-PLAN-01062, Weapon Quality Assurance Program – Production Agency](#)
- **E-6 supports all US Nuclear Weapons Systems**
 - Current Stockpile- Surveillance, Manufacturing, Testing, Emergency Response
 - Full-up assemblies
 - Parts
 - Retired Stockpile- Surveillance, Emergency Response
- **E-6 also does some non-weapons production and basic/applied R&D work**
 - NASA, work for industry where unique capability exists (eg., Microtron)
- **ASME BPVC, B31.1, NQA-1 may apply**

Major NDT Programs

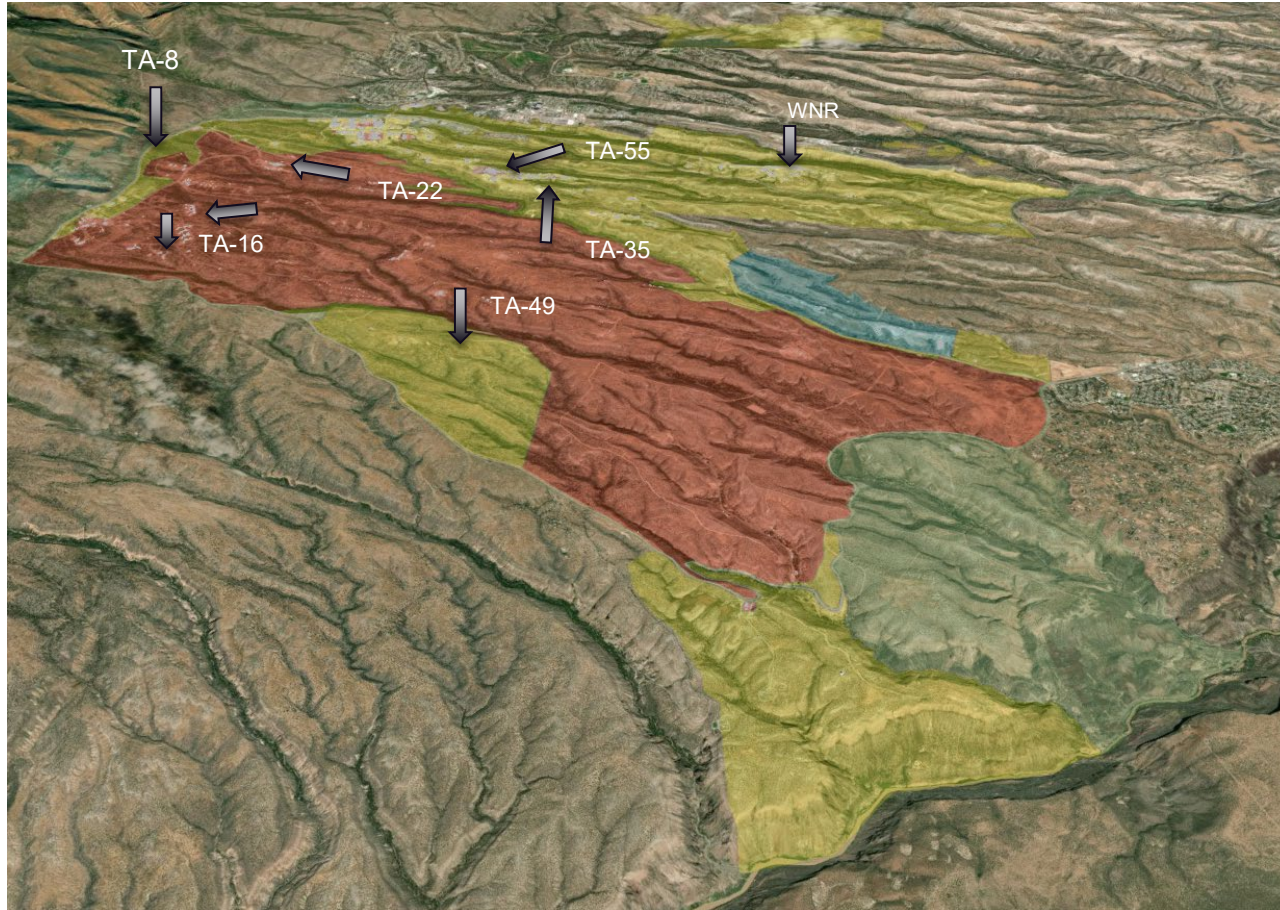
- **Over 800 Inspection Jobs this CY (some jobs >20 parts per job)***
 - 55% of Inspections were CT
 - 22% of Inspections were RT
 - 5% of Inspections were DR
 - 3% of Inspection were UT
 - 2% of Inspections were MT
 - 1% of Inspections were PT
 - 12% were multiple methods
- **Supporting all Manufacturing, Weapons Assembly Testing, Surveillance at LANL**
- **Support ARG, DFEAT**
- **External Participation in various ASNT and ASTM Committees**
- **Provide Design Agency Assistance**

*- Data taken from Job Order System and may not reflect all of the jobs performed

LANL Campus Overview



E-6 Onsite NDT Prescence



TA-8 E-6's Homebase



- TA-8-21
 - Office space and low hazard Ultrasonic Testing work
 - TA-8-120
 - 4 low energy x-ray cabinets
 - High energy x-ray bay
 - Up to 7 MeV portable systems
 - Digital Panel Laboratory
 - TA-8-22
 - Nuclear Magnetic Resonance Laboratory
 - Magnetic Particle Laboratory
 - Dye Penetrant Laboratory
 - Eddy Current Laboratory
 - X-ray Fluorescence Laboratory
 - Ultrasonic Testing Laboratory
 - Medium Energy X-ray Bay
 - 450 KeV
 - 225 Kev
 - High Energy X-ray Bay
 - 15/9 MeV *
 - Dithering System*
- *- In installation process

Radiography Equipment

E-6 Equipment

Location	Machine
TA-8-22	Varex K15
	Philips 450
	X-ray Work 225
	NQR
	Eddy Current
	MagnaFlux
	UT Inspection Stations
	InnovX XRF
	Bruker XRF
TA-8-23	Microtron
	North Star 450
	Hamamatsu 150
TA-8-120	Varex NX-1
	NSI X25
	NSI X3000
	Bruker Skyscan 1272
	Hytec 150 KeV Cabinet A
TA-8-21	UT equipment
TA-16-260	Picker 150
	Philips 420
TA-22-93 Rm 119C	NSI X25
TA-22-115-106	NSI X25
TA-55 PF-4	Varex NX-1
	Varex M6A
	VJ225
	Torrex 150 C
	Hytec 150 Cabinet
TA-35-207	Hytec 150 Cabinet
WNR	Neutron Radiography
DAF	Varex K15
	Yxlon Comet XMB-160
	Golden XR200
	Golden XRS-3
	Golden XRS-4
Field	Portac 6D
	Portac 6B
	JME PXB-6
	Instauro SEA-7
	Golden XR200
	Golden XRS-3
	Golden XRS-4
	Portac 6D
	Portac 6B
	JME PXB-6
	Instauro SEA-7
Other equipment	Film Processor 23
	Film Processor 22



Portable Betatron



Small weight/size
low energy x-ray



Portable Linac at Crash Test

We also operate at
Nevada National Security Site
Sandia – Tonopah
Sandia - Albuquerque

Recent NDT Equipment

- **Varex K15- 15 MeV/9 MeV Dual Energy System**
 - Installed at TA-8-22
- **Varex M6A- 6 MeV/3.5 MeV Dual Energy System**
 - Installed at TA-55-PF-4
- **Varex NX-1- 950 kV Portable System**
 - 1 system installed at TA-55-PF-4
 - 2 systems at TA-8-120
- **North Star Imaging X25 Microfocus System**
 - 3 Installed at TA-22
 - 1 Installed at TA-8-120
 - 1 to be Installed at TA-16-260
- **North Star Imaging X3000 Microfocus System**
 - Installed at TA-8-120
- **North Star Imaging X5000 Dual Tube- Microfocus System**
 - 4 Systems to be Installed

New NDT Equipment cont.

- **Robotix Part Handler**
- **450 kV Comet System**
- **Two NDT-U Film Processors**
- **Three Zetec Eddy Current Inspection System**
- **Two Utex General Purposed Heat Source UT Inspection Stations**
- **Two M2M Gekko Phased Array UT Inspection Systems**
- **Peak NDT Phased Array UT Inspection System**
- **Olympus 650 UT Inspection System**
- **Olympus 6CT Inspection System**
- **High Energy CT Dithering System**
- **GE CRx Vision CR Scanner**
- **Durr HD-CR 35 CR Scanner**

Recent Purchases



Eddy Current



X-ray Head and Modulator

1 MeV X-ray



3/6 MeV Linac



Computed
Radiography

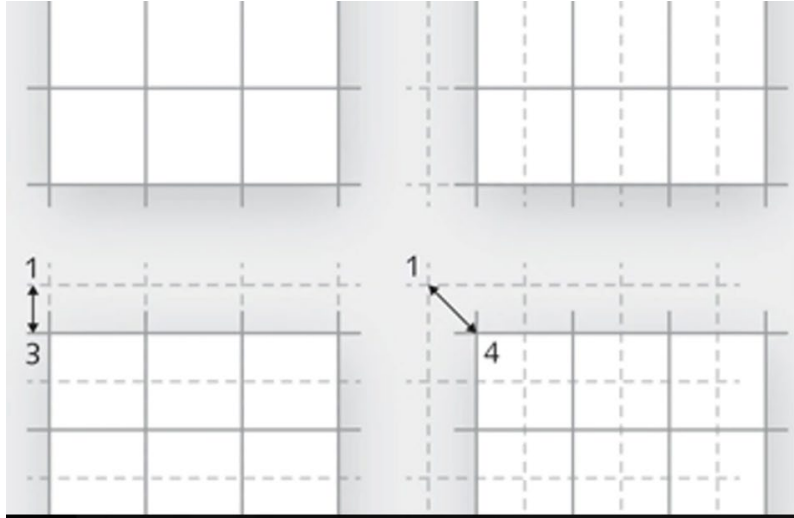


15 MeV Linac

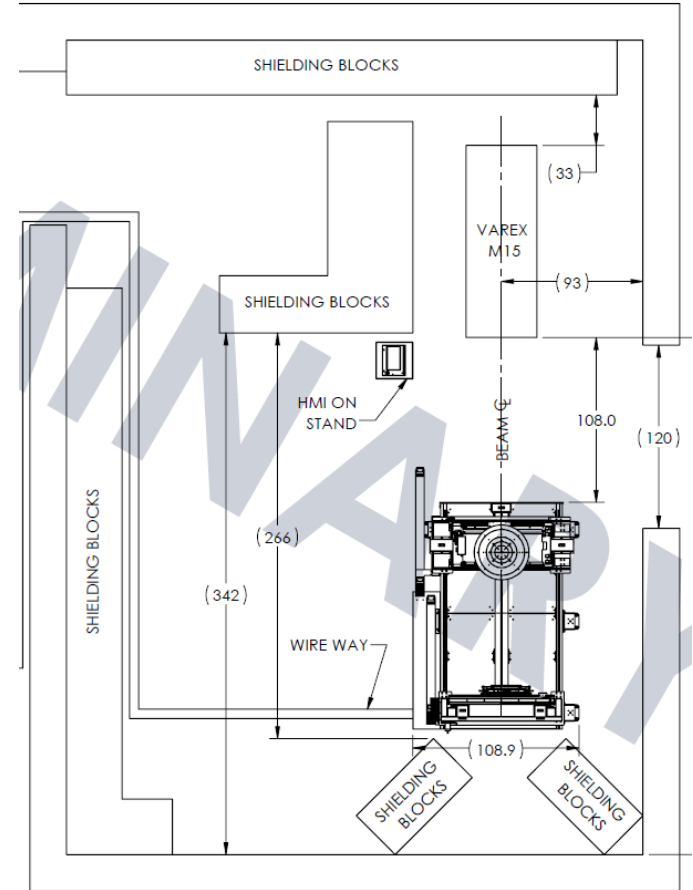


Hi-Resolution
Computed
Radiography

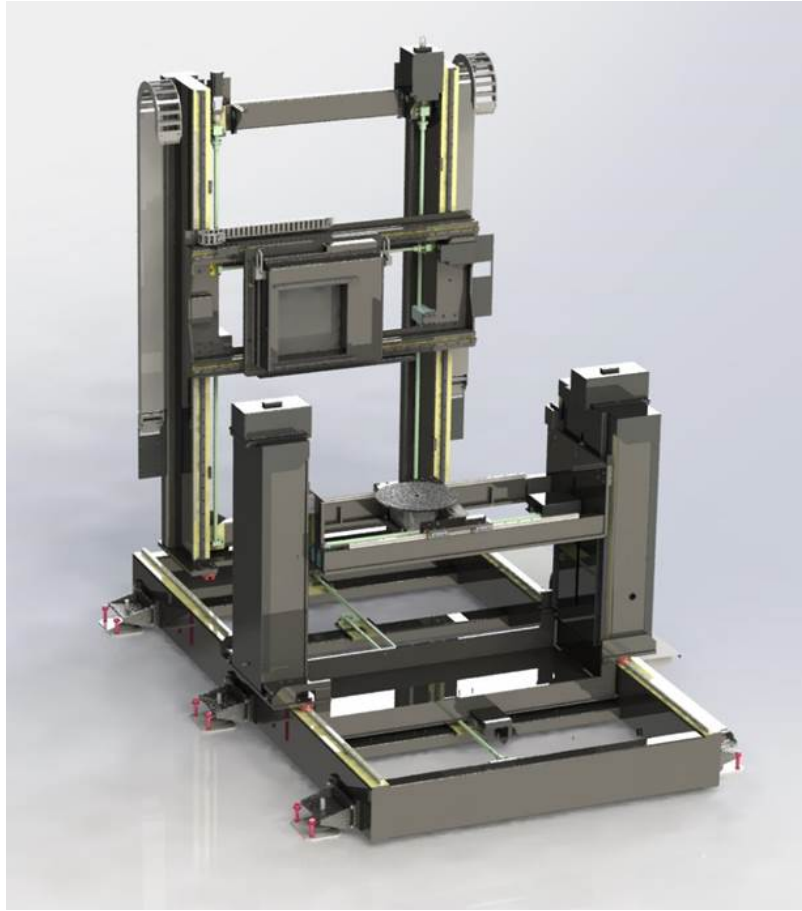
Dithering System/K15 Conceptual Design



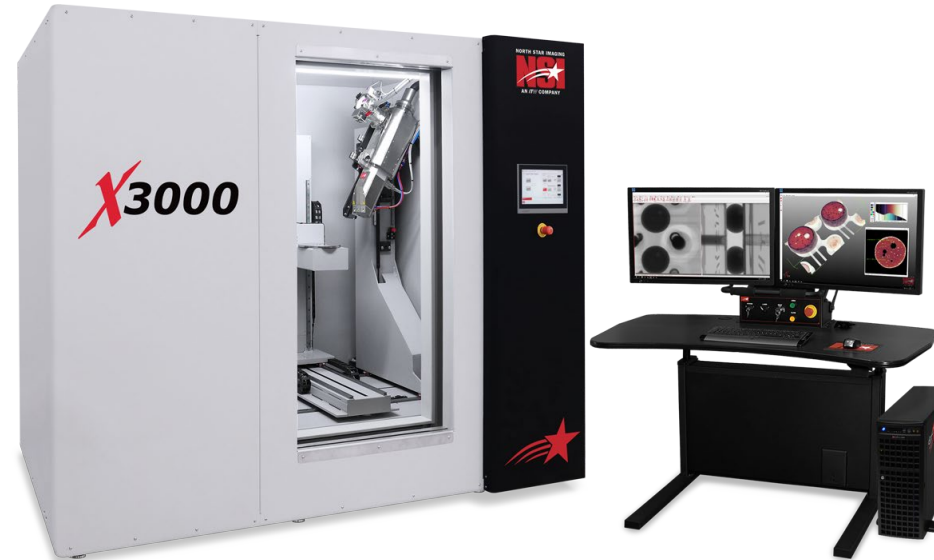
Dithering Concept- Taking 4
Offset Images on One Pixel



Dithering System/K15 Pairing



North Star Imaging CT Cabinets



- Currently Have 4 X25 CT cabinets-Three for Detonator Inspection and One at TA-8.
- Purchasing One for High Explosives Area, FY20

X3000 is housed at TA-8-120

North Star Imaging CT Cabinets cont.



- Four X5000 being Purchased for Pu Sus (FY20)
- One at TA-8
- One TA-3 (Cold Lab)
- Two at TA-55

NDT Certification Overview

NDT Certification

- **Not just a professional certification**
- **Not just a best practice**
- **Not just an industry expectation**
- **It is a NNSA and LANL requirement!**

NDT Certification Program Drivers

- DOE O 414.1D [Quality Assurance](#)

- LANL QAPD: SD330 [Los Alamos National Laboratory Quality Assurance Program](#)

- **Work Types**

- Nuclear Facility*
 - Weapons Production*
 - Weapons R&D*
 - Radiological Facilities*
 - Accelerator Facility
 - Non-weapon production**
 - Industrial/Commercial Facility**
 - Utilities and Infrastructure**
 - Radiological P&T*
 - Basic/Applied R&D (SD601/PD370)
 - Other P&T
 - Administrative

* additional requirements exist

** additional requirements may exist

E-6 Certification Program

- Existing Program
 - AET-QP-ND-01 Rev. 10
 - ASNT SNT-TC-1A Recommend Practice compliant
- New Program (Oct 1, 2020)
 - E-6-QI-0012
 - ASNT CP-189 compliant
 - Main driver is ASME BPVC: 3 pages of changes to required if SNT-TC-1A is used
 - Vessels
 - Heat sources
 - WETF

E-6 Certifications

- **RT**
 - 4 Level III
 - 11 Level II
 - 2 Level I
- **UT**
 - 1 Level III
 - 2 Level II?
- **PT**
 - 1 Level III
 - 4 Level II
- **MT**
 - 1 Level III
 - 2 Level II
- **ET**
 - 2 Level III
- **VT**
 - 1 Level III
- **CWI**
 - 1 SCWI
- **CRI**
 - 1 CRI

E-6 Experience

- **RT**
 - 2 x 30 yrs
 - 4 x 20 yrs
- **CT**
 - 4 x 15 yrs
- **UT**
 - 1 x 25 yrs
 - 1 x 20 yrs
- **PT**
 - 1 x 40 yrs
 - 1 x 20 yrs
- **MT**
 - 1 x 20 yrs
- **ET**
 - 1 x 20 yrs
 - 1 x 15 yrs
- **VT**
 - new
- **CWI**
 - 1 20 yrs
- **CRI**
 - 1 5 yrs

Other Qualifications

- **Explosives Handlers**
- **Explosives Safety Officer**
- **Fissile Material Handlers**
- **Electrical Safety Officer**
- **Emergency Response Personnel**

Questions/Other Discussion
